MATH102 11SP Midterm ch7-10
B [answers in web view] Total points: 70

Name:_____
Student ID:_____

> Let the words of my mouth and the meditation of my heart
> Be acceptable in Your sight, O LORD, my Rock and my Redeemer.
> -- Psalm 19:14

- Please show all your work! No partial credit will be given for incorrect answers with no work shown.
- Please draw a box around your final answer.
- You are only permitted to use your own calculator and writing implements. Cell phones should be muted and left in your pocket or bag.
- All relevant tables are attached to the back. You may detach them for your reference.
- Assume $\alpha = 0.05$ everywhere unless indicated otherwise.
- For t-tests on two groups, if the df is not given, you may use the conservative estimate of $df = \min(n_1, n_2) - 1$.

1. Drug company "Faizer" claims their antidepressant is preferred by 30 out of 40 physicians. In response, drug company "Vonartis" claims their antidepressant is preferred by 55 out of 60 physicians. Is Vonartis' drug significantly more preferred than Faizer's?

   (a) State the null and alternative hypotheses, both in **words** and in **notation**. [3]

   (b) What statistical **test** is be appropriate to test the hypothesis?
   Should it be 1-tailed or 2-tailed? [2]

   (c) **Run** the test (either p-value or classical approach) and draw a conclusion. [4]

   (d) **Interpret** your conclusion in the context of the two drug companies.
   Please use complete English sentences. [2]

   (e) What **assumptions** did you rely upon in conducting the test? Are the assumptions met? Why? [2]

2. Human beta-endorphin (HBE) is a hormone secreted by the pituitary gland under conditions of stress (like exams!). Suppose we wish to determine whether blood concentration of **HBE** (pg/mL) is different for men who **exercise** regularly as compared with men who do **not exercise** regularly.

(a) State the null and alternative hypotheses, both in **words** and in **notation**. [3]

(b) What statistical **test** is be appropriate to test the hypothesis? Should it be 1-tailed or 2-tailed? [2]

(c) Data for this experiment are given below. Sketch **boxplots** for the data, on a common axis (number line). [4]

								Mean:	SD:
Exercisers:	60	58	63	49	51	43	54	54	6.9282
Non-exercisers:	41	37	51	60	28	35		42	11.6276

(d) **Run** the test (either p-value or classical approach) and draw a conclusion. [4]

(e) **Interpret** your conclusion in the context of the original research question. Please use complete English sentences. [2]

(f) What **assumptions** did you rely upon in conducting the test? [2]

3. Does HBE concentration in men increase after they exercise?
Data from a study of 6 men are below.

							Mean	SD
Before:	42	55	39	50	49	47	47	5.762
After:	47	55	44	51	49	54	50	4.195

(a) State the null and alternative hypotheses, both in **words** and in **notation**. [3]

(b) What statistical **test** is be appropriate to test the hypothesis?
Should it be 1-tailed or 2-tailed? [2]

(c) **Run** the test (either p-value or classical approach) and draw a conclusion. [4]

(d) **Interpret** your conclusion in the context of the original research question.
Please use complete English sentences. [2]

(e) What **assumptions** did you rely upon in conducting the test? [2]

4. A factory needs to ensure that the widgets it produces have variance no more than $2.5mm^2$. An inspector from corporate headquarters randomly selects 41 widgets from the factory, to check if the factory is within specifications. Those 41 widgets have a variance of $3.6mm^2$ in length.

(a) State the null and alternative hypotheses, both in **words** and in **notation**. [3]

(b) What statistical **test** is be appropriate to test the hypothesis?
Should it be 1-tailed or 2-tailed? [2]

(c) **Run** the test (either p-value or classical approach) and draw a conclusion. [4]

(d) **Interpret** your conclusion in the context of the original research question. Please use complete English sentences. [2]

(e) What **assumptions** did you rely upon in conducting the test? [2]

5. "Faizer" and "Vonartis" also produce competing blood **glucose** monitors. An independent lab obtains one glucose monitoring device from each company. A single sample of blood is tested 15 times in each company's glucose monitoring device. Faizer's device yields a standard deviation of 0.35 mmol/L; Vonartis' device yields a standard deviation of 0.22 mmol/L. Is there a difference in the **precision** of the two companies' devices?

   (a) State the null and alternative hypotheses, both in **words** and in **notation**. [3]

   (b) What statistical **test** is be appropriate to test the hypothesis? Should it be 1-tailed or 2-tailed? [2]

   (c) **Run** the test (either p-value or classical approach) and draw a conclusion. [5]

   (d) **Interpret** your conclusion in the context of the two drug companies. Please use complete English sentences. [2]

   (e) What **assumptions** did you rely upon in conducting the test? [2]