Name: __________

Section: __________

Math 182, Practice Test 1. Spring 2020.

Show all work for full credit. Use reduced fractions instead of decimals unless otherwise mentioned.

(1) Compute the indefinite integral.

$$\int x^5 \cos\left(x^6\right) dx$$

(2) Compute the definite integral.

$$\int_1^e \frac{\sqrt{ln(x)}}{x} dx$$

(3) Find the area of the region bound between the curves $f(x) = x^2$ and $g(x) = \sqrt{x}$. (Hint, use the "washer" methed and dx.)

(4) Find the volume obtained by rotating the region from problem (3) around the x-axis. (Hint:)

(5) Find the volume obtained by rotating the region bounded by $y = \dfrac{1}{1+x^2}$, $x = 0$, $x = 1$, and the x-axis about the y-axis. (Hint: use the "shell" method and dx.)

(6) Find the volume obtained by rotation the region bounded by $y = e^x$, $y = 1$, and $x = 1$ around the vertical line $x = -1$. (Hint: Use the shell method and dx.)

(7) Compute the improper integral using a limit. Does it converge or diverge? If it converges, what does it converge to?

$$\int_2^\infty \frac{1}{x^3} dx$$

(8) Compute the improper integral using a limit. Does it converge or diverge? If it converges, what does it converge to?

$$\int_0^8 \frac{1}{\sqrt[3]{x}} dx$$

(9) Compute the improper integral using a limit. Does it converge or diverge? If it converges, what does it converge to?

$$\int_1^\infty \frac{1}{\sqrt[3]{x}} dx$$

Solutions

1. $\frac{1}{6}\sin(x^6) + c$

2. $\frac{2}{3}$ (Note: I used the facts that $\ln(e) = 1$ and $\ln(1) = 0$, these will be helpful for the test.)

3. $\frac{1}{3}$

4. $\frac{3\pi}{10}$

5. $\pi\ln(2)$

6. $4\pi - \frac{3\pi}{2} + 2\pi\ln(\frac{1}{2})$ (Note: If a problem like this is on the test, it will be extra credit.)

7. Converges to $\frac{1}{8}$

8. Converges to 6

9. Diverges (Note: you can either use the limit to show that this diverges, or simply note that this diverges by the "p-test" with $p = \frac{1}{3}$, which would earn full credit on the test.)