Circle your Instructor:
Faudree, Williams, Zirbes

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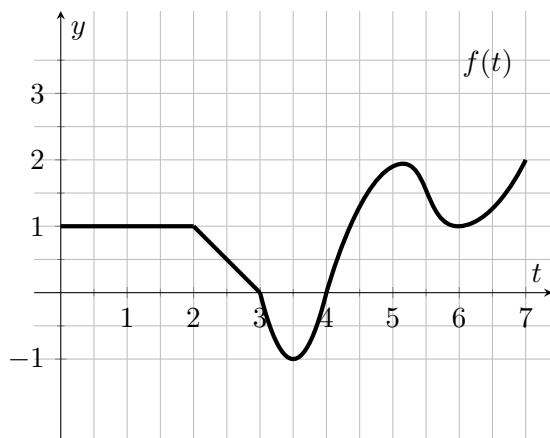**Math 251 Fall 2017**   **Quiz #11, November 29th**

Name: _Solutions_ _____

There are 25 points possible on this quiz. This is a closed book quiz. Calculators and notes are not allowed. **Please show all of your work!** If you have any questions, please raise your hand.

Exercise 1. (3 pts.) Let $g(x) = \int_0^x f(t)dt$ where the graph of $y = f(t)$ is displayed below.

(a) Find $g(3) = 2 \cdot 1 + \frac{1}{2} \cdot 1 \cdot 1 = \frac{5}{2}$

(b) In the open interval $(0,7)$, when does $g(x)$ have a maximum?

$x = 3$

(c) When is $g(x)$ increasing?

$(0,3) \cup (4,7)$

Exercise 2. (5 pts.) Find the derivative of the function.

(a) $g(x) = \int_x^2 \sin t \, dt$

$g'(x) = -\sin(x)$

(b) $F(x) = \int_0^{x^2} \sqrt{2+t^3} \, dt$

$F'(x) = \sqrt{2+x^6} \cdot 2x$

$= 2x\sqrt{2+x^6}$

Exercise 3. (3 pts.) What, if anything, is wrong with the following calculation?

$$\int_0^5 \frac{1}{x-3}dx = \ln|x-3|\Big|_0^5 = \ln 2 - \ln 3 = \ln\left(\frac{2}{3}\right)$$

$\frac{1}{x-3}$ is not continuous on $[0,5]$

so FTC doesn't apply

Exercise 4. (6 pts.) Evaluate the following integrals.

(a) $\int_0^{\pi/4} (2\sec^2 t - e^t)dt$

$= 2\tan t - e^t \Big|_0^{\pi/4}$

$= 2 \cdot 1 - e^{\pi/4} - (0 - 1)$

$= 3 - e^{\pi/4}$

(b) $\int_0^1 \frac{2}{\sqrt{1-x^2}}dx$

$= 2\arcsin(x) \Big|_0^1$

$= 2 \cdot \frac{\pi}{2} - 2 \cdot 0$

$= \pi$

Exercise 5. (8 pts.) Evaluate the following integrals.

(a) $\int_0^1 (v^2 + 3)^2 dv$

$= \int_0^1 v^4 + 6v^2 + 9 \ dv$

$= \frac{v^5}{5} + 2v^3 + 9v \Big|_0^1$

$= \frac{1}{5} + 2 + 9$

$= \frac{56}{5}$

(b) $\int_1^9 \frac{(3-t)}{\sqrt{t}}dt = \int_1^9 3t^{-1/2} - t^{1/2} \ dt$

$= 6t^{1/2} - \frac{2}{3}t^{3/2} \Big|_1^9$

$= 18 - 18 - (6 - 2/3)$

$= -16/3$